

FINAL ~~DRAFT~~ TECHNICAL MEMORANDUM

PHASE II BASELINE ECOLOGICAL ASSESSMENT SUMMARY OF RESULTS KANE AND LOMBARD SUPERFUND SITE BALTIMORE, MARYLAND

VOLUME 2 OF 3

Prepared For

American Telephone and Telegraph Company
Baltimore Gas and Electric Company
Browning-Ferris, Inc.
General Motors Corporation

By

Harding Lawson Associates
Philadelphia, Pennsylvania

March 17, 1995

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REPORT OR DOCUMENT TITLE Final Technical Memorandum, Phase II Baseline
Ecological Assessment Summary of Results, Volume 2 of 3

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DESCRIPTION OF IMAGERY Kane & Lombard Phase II FAA Stormwater Drainage
Video Survey

NUMBER AND TYPE OF IMAGERY ITEM(S) 1 videotape

1960-1961

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APPENDIX F

STORMWATER DRAINAGE SYSTEM INVESTIGATION SUMMARY OF RESULTS

AR301923

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PHOTOGRAPHS

AR301924

APPENDIX F
KANE AND LOMBARD SUPERFUND SITE PHASE II ECOLOGICAL ASSESSMENT AREA
STORMWATER DRAINAGE SYSTEM INVESTIGATION

1.0 INTRODUCTION

Based on the findings of the Phase I Baseline Ecological Assessment, a stormwater drainage system investigation was conducted for the area included within the Phase II Ecological Assessment Area (Phase II EAA). This investigation included a remote video survey of the accessible portions of the underground stormwater drainage system, a field reconnaissance of the aboveground stormwater drainage pathway, and a review of City of Baltimore stormwater drainage plans. A site location map is presented in Figure F-1.

Purpose and Scope

The purpose of this investigation was to characterize the potential exposure pathways associated with the stormwater drainage system and to characterize the stormwater structures noted on drawings provided by the City of Baltimore dated between 1927-1959 with undated revisions (Phase I Technical Memorandum). To accomplish this task, HLA conducted a limited visual field reconnaissance of the above ground portion of the Phase II EAA stormwater management system and a remote video survey of the underground portion of this system. The investigation was designed to address the following issues:

- To verify the system layout identified on City of Baltimore stormwater drainage plans.
- To evaluate the condition of the underground stormwater drainage pipelines and culverts.
- To identify areas where groundwater may be entering the system.
- To identify other connections and potential sources contributing to the stormwater drainage system and the resulting discharge.

A map showing the general stormwater pattern within the Phase II EAA is presented in Figure F-2. The stormwater drainage system as mapped by the City of Baltimore is shown in Figure F-3.

2.0 METHODOLOGY

The field reconnaissance and video survey described below were conducted on November 3, 4, 12, 13, and 14, 1994. The video survey was conducted by Allstate PowerVac of Linden, New Jersey with oversight by HLA. A map detailing the structures, flow patterns and other features identified in association with the Phase II EAA stormwater management system is presented in Figure F-6. Surface features and parts of the video survey activities described below are documented in Photographs F-1 through F-26. The photograph locations and directions of view are shown on Figure F-4.

A limited visual field reconnaissance of the above-ground portion of the Phase II EAA stormwater drainage system was conducted to identify and map the drainage swales and surface structures associated with this system. Drainage structures identified included manholes, inlet structures, outlet structures, culverts, catch basins and drainage channels. Some of these structures were surveyed to verify their location.

A video survey was conducted of the underground portion of the Phase II EAA stormwater drainage system. This video survey was accomplished using a mechanized camera, which consisted of a video camera attached to a tractor. (Photograph F-2). The camera unit was connected to recording equipment and remotely controlled via wire cable. The unit recorded the length of cable to document the distance that the camera unit traveled.

The camera was placed into the mouth of accessible inlet and outlet structures or lowered into manholes by the attached recovery cable. The camera and tractor unit were operated remotely from a control center located in the support truck. The camera operator was able to view the video image from the control center. Although the tractor could only move forward and backward with no steering capability, the direction and focus of the camera lens could be adjusted remotely to view any forward angle. The camera was equipped with high-power adjustable lights to enhance visibility (Photograph F-3).

3.0 RESULTS OF INVESTIGATION

Stormwater associated with the Kane and Lombard Study Area drains northeastward through a system of drainage swales, underground pipelines and culverts which terminate at a single point on Herring Run.

The limited visual reconnaissance of the Phase II EAA identified the following drainage patterns. Runoff from the Superfund Site drains to the east and to the west. Runoff to the west of the Superfund Site flows into the adjacent wetlands located on the Roadway Express Inc. (Roadway) property. A drainage swale is located along the southern side of East Lombard Street channeling flow from west into the wetlands on the Roadway property. Additional runoff enters this system from East Lombard Street to the north, the Roadway facility to the west and the high school property to the south. The runoff collected in this wetland area is then channeled northward through a manmade culvert under East Lombard Street (Figure F-6, Photograph F-4) and then to the east on the northern side of the PICORP facility. A manhole and outlet structure were identified on the northern side of East Lombard Street (Figure F-6, Photograph F-5).

Runoff from the eastern portion of the Superfund Site is captured by a swale on the Superfund Site lined with riprap and channeled into stormwater catch basin in the northeast corner of the Superfund Site (Figure F-6, Photograph F-6). The water collected in this catch basin enters a 36-inch reinforced concrete pipe (RCP) which drains in a northeastern direction.

A manhole, labelled as MH-2, was identified approximately 90 feet from the catch basin (Figures F-5 and F-6, Photograph F-7, Video Segment 3). MH-2 is located on the northern side of the Patterson High School ball fields just outside the fenced area (Figure F-2). At the time of the video survey, there was no flow between the catch basin and MH-2, although debris had settled at the bottom of the pipe at MH-2. *A small hairline crack was observed 11 feet northeast of the catch basin and there was staining on the top of the pipe 59 feet northeast of the catch basin that is believed to be from flow during periods of high water.* Lift holes on the top of the pipes were observed along the length of the drainage pipe with the steel reinforcement showing through in one location. Continuing approximately 10 feet past MH-2, the 36-inch RCP connects to a chambered area labeled as Chamber 1 (Figure F-6). There is no manhole access to Chamber 1.

Stormwater drainage also enters Chamber 1 from a 36-inch clay pipe coming from the southeast of Chamber 1. At the junction, this clay pipe is in good condition with no signs of leaking. At the time of the video survey, significant water flow was observed coming into Chamber 1 from this pipe. The video camera was sent into the 36-inch clay pipe and a manhole, labeled MH-1, was identified approximately 46 feet to the southeast of Chamber 1. This manhole is located within the fenced area at the Patterson High School ball fields (Figure F-2, Photograph F-8 and Figure F-5, Video Segment 2).

A 36-inch RCP leads from MH-1 towards the east. Approximately five feet from MH-1, the pipe has been sealed with bricks. Flow from the southeast, enters MH-1 via a 36-inch RCP. The condition of the pipe is good with the exception of a possible small leak and sediment buildup approximately 52 feet southeast of MH-1. Approximately 230 feet southeast of MH-1, a circular manhole was identified and labeled as MH-1A (Figure F-5 and F-6, Video Segment 1). There is no above-ground access to MH-1A, which is believed to be located in the Patterson High School ball fields. The stormwater drainage system continues past MH-1A towards the southeast. The southern extreme of the video survey was terminated at MH-1A to maintain the scope of the survey within the Phase II EAA boundary.

The stormwater drainage maps from the City of Baltimore show an historical stream channel in the southeastern portion of the Phase II EAA near the location of the stormwater drainage system. Based on the flow observed in this area of the stormwater drainage system and the lack of recent precipitation, it is speculated that the stormwater drainage system now carries the flow from the stream mapped by the City.

The manhole located in the westbound lane of East Lombard Street, across from the Patterson High School ball fields, was labeled MH-1B (Figure F-6, Photograph F-9). The drainage system associated with MH-1B is a box culvert measuring approximately three feet by eight feet. The condition of the box culvert is good, although substantial amount of debris and sediment deposits were identified in the video survey. From MH-1B heading in a southern direction approximately 20 to 30 feet against the flow, the drainage system changes to a round pipe that is assumed to be connected to Chamber 1 (Figure F-6). The camera unit was unable to get to this point because of debris blocking its path; therefore, the connection between Chamber 1 and MH-1B could not be verified (Figure F-5, Video Segment 5).

From MH-1B heading north with the direction of the flow under the PICORP facility, the drainage system continues in what is believed to be a 3-ft by 8-ft box culvert. A manhole, with no above-ground access was identified approximately 33 feet north of MH-1B (Figure F-6). Approximately 112 feet north of MH-1B, a pipe was identified coming in from the east, and approximately 114 feet north of MH-1B, a pipe was identified coming in from the west. A pipe was also identified coming in from the top of the pipe at approximately 139 feet north of MH-1B. Approximately 150 feet north of MH-1B, the drainage system changes from a 3-ft by 8-ft box culvert to a round pipe believed to be 36 inches in diameter. The camera unit was unable to go beyond this point due to debris blocking its path. Most of the pipeline survey in this segment (Figure F-5, Video Segment 6) is located beneath the PICORP facility. At this point the camera unit was taken to the excavated catch basin north of the PICORP facility and sent south under PICORP.

On the northern side of the PICORP facility the stormwater drainage system was accessed via an excavated catch basin (Figure F-2, Photograph F-10). The eastern and western runoff flow paths from the Superfund Site connect in this catch basin. The western runoff flow path drains eastward on the north side of PICORP and flows into the catch basin while the eastern runoff flow path drains into the catch basin from the stormwater drainage pipe coming from the south.

From the catch basin on the north side of the PICORP facility (Figure F-6) the camera unit was sent in a southern direction, under the PICORP facility and against the direction of flow, towards East Lombard Street (Figure F-5, Video Segment 7). As seen in the video, the drainage system consists of a 42-inch RCP in poor condition (Photograph F-11). Most of the joints along the length of the pipe under the PICORP facility are separated. From the northern end, the pipe tends to bend to the right (west) along much of its length (Figure F-6). At several locations, the pipe is chipped and eroded, and the steel reinforcement is exposed. Cracks in the pipe with staining and evidence of possible leakage were observed at several locations along the length of the pipe under the PICORP facility. Eroded fill material from outside the pipe is seen at several of the pipe separations.

The curve observed in the pipeline under the PICORP facility (Figure F-5, Video Segment 7) closely matches the historical stream channel identified on City of Baltimore stormwater drainage system maps. Based on this observation, it is assumed that the stormwater drainage pipes were laid in the historical stream channel prior to landfill activities.

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Approximately 117 feet south of the excavated catch basin north of the PICORP facility, a separation of approximately one foot was observed between two sections of pipe. The separation appears to have created a sinkhole at this location approximately 10 feet deep (Figure F-2, Photograph F-12, and Figure F-5, Video Segment 7). Fill material such as tires, rope, and stones were observed at this location.

A hole approximately 10 inches across was identified in the bottom portion of the pipe approximately 120 feet south of the excavated catch basin. On the video, a portion of the flow is seen being diverted to the east from the pipe into this hole. At approximately 157 feet from the excavated catch basin, two pipes were identified coming in from the east, one on top of the other. The top pipe appeared to be plugged. Staining from flow was observed at these services. Approximately 340 feet south of the excavated catch basin, another pipe was identified coming in from the east. A large separation in the pipeline prevented the camera unit from going beyond 515 feet (Figure F-5, Video Segment 7). Although the connection between MH-1B on East Lombard Street and the catch basin on the north side of the PICORP facility was not verified by the video survey, these two areas are believed to be connected based on their proximity and the pathway shown on the City of Baltimore stormwater drainage plans.

From the excavated catch basin north of the PICORP facility (Figure F-6), stormwater flow leaves the OU-2 Study Area and is channeled north under the Conrail Oranville Railroad Yard (Conrail Yard) via a 36-inch RCP (Photograph F-14). The camera unit proceeded north from the excavated catch basin with the flow into this pipe (Figure F-5, Video Segment 8). The condition of the pipe is good except for a few locations where there are small hairline cracks. No evidence of leaking was observed at these cracks. At approximately 188 feet north of the excavated catch basin, a square chamber manhole was identified and labeled as Manhole 4 (MH-4). MH-4 is approximately 15 feet deep. A significant discharge was observed flowing from the top of this manhole chamber into the stormwater drainage system. Field personnel noted no significant precipitation in the area for several days prior to observing this discharge.

Another square chamber manhole (MH-5) was identified approximately 250 feet north of the excavated catch basin. A significant discharge was observed coming into the stormwater drainage system from the top of this chamber and from a service, approximately 15 to 24 inches in diameter, coming in the chamber from the west. As seen on the video tape at the end of Segment 8, at approximately 345 feet north of the excavated catch basin on the PICORP Property, the 36 in. RCP drainage system changes to a box culvert approximately 3-ft wide and 5-ft high. Photograph F-15 shows the box culvert outlet on the north side of the Conrail Yard (Figure F-6). The camera unit was unable to pass debris collected at this point.

The camera unit was then sent south against the flow into the box culvert from the north side of the Conrail Yard (Figure F-5, Video Segment 9). The 3-ft by 5-ft box culvert is constructed of stone and appears to be quite old. Sediment and debris covers a majority of the floor in this culvert. Flow is observed at several locations entering between the stones and from cracks in the culvert. The camera unit was able to reach the point where it had been blocked when coming from the north.

The 3-ft by 5-ft box culvert discharges to a concrete-lined channel (Figure F-6, Photograph F-16) on the north side of the Conrail Yard, approximately 480 feet north of the excavated catch basin. The channel is approximately 10 feet wide and 20 feet long. The channel also receives drainage from the west via a drainage channel adjacent to the Conrail Yard.

The drainage channel entering the system from the west, receives drainage from a 24 in. pipe approximately 50 feet west of the concrete lined channel (Figure F-6, Photograph F-18). An inlet structure which appears to be connected to this pipe was identified between the railroad tracks just southwest of the concrete lined channel (Figure F-6, Photograph F-17). The structure appears to drain runoff from between the railroad tracks. A circular, above ground structure which may be associated with the stormwater drainage system was identified adjacent to the east side of the concrete drainage channel during the field reconnaissance (Figure F-2, Photograph F-19). The purpose and extent of this structure is unknown.

Flow received by the open, concrete-lined channel is discharged into a 48-inch RCP heading north under a parking lot toward North Point Boulevard (Photograph F-20). This segment of the stormwater drainage system is shown in Video Segment 9 as identified on Figure F-5. The segment was recorded south against the flow from MH-6 on North Point Boulevard. This pipe is in good condition except for a few joints with evidence of leaking. As shown on Figure F-6, a service with light flow was observed entering from the west. MH-6, is located in the east bound lane of North point Boulevard (Figure F-6, Photograph F-21). Photograph 22 shows a view south from the brick-lined chamber of MH-6 into the 48-inch RCP. At this manhole chamber, a service was identified entering from the southeast (Figure F-2, Photograph F-23). This service was not recorded on the video survey. It is believed that this service pipe is connected to the stormwater drain on North Point Boulevard which receives drainage from the eastern portion of the PICORP facility and the Conrail Yard as discussed below.

An additional drainage area was identified north of the PICORP facility and to the east of the excavated catch basin. Flow from this area drains to the east. As shown on Figure F-6, this area contains a bermed retention basin approximately one acre in size which receives drainage from the north eastern portion of the PICORP facility. A system of drainage pipes and swales, channel stormwater from this retention basin and adjacent areas of the Conrail railroad yard into a culvert constructed under the Conrail Railroad Yard driveway. The culvert discharges to a drainage swale on the west side of the driveway which channels the flow along the western side of North Point Boulevard to a stormwater drain on the eastern side of the railroad bridge (Figure F-6, Photograph F-13). A pipe was observed entering MH-6 on North Point Boulevard from the direction of the stormwater drain receiving flow from this additional drainage area. Figure F-6 presents the assumed pathway of the pipeline from the drain to MH-6. As discussed below the combined flow from the two drainage areas associated with the Study Area enter the 5-ft by 10-ft box culvert which terminates at Herring Run to the north.

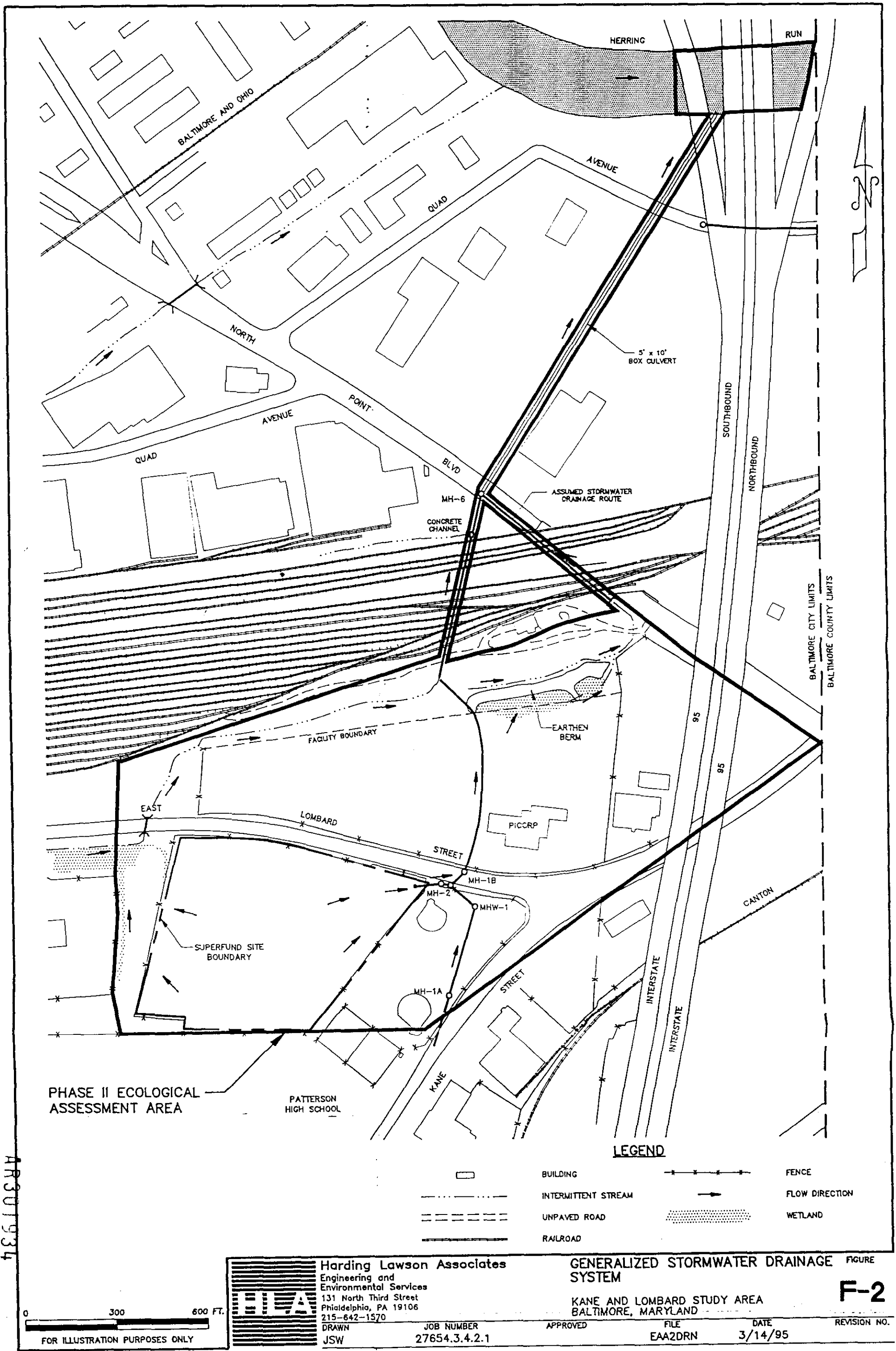
From MH-6 north, towards Herring Run, the drainage system consists of a 5-ft by 10-ft box culvert (Figure F-6, Photograph F-24 and Figure F-5, Video Segment 10). The condition of the culvert is good; although, substantial debris and rocks have been deposited on the bottom. A service coming in from the west was identified at approximately 64 feet north of MH-6. A service coming in from the east was identified approximately 71 feet north of MH-6. This service is believed to carry stormwater draining from the westbound lane of North Point Boulevard. Observations by field personnel who entered the manholes confirmed that this service receives flow from the manhole chamber in the westbound lane (Figure F-2, Photograph F-25). The camera unit was unable to go beyond 248 feet north of MH-6 due to debris in the box culvert. A point of light visible on the video tape at this point is assumed to be the open end of this box culvert at Herring Run.

The camera unit was moved to the terminal end of the Phase II EAA stormwater drainage system at Herring Run (Figure F-6, Photograph F-28). From this point the camera unit proceeded south against the flow (figure F-5, Video Segment 11). The condition of the culvert is good. Two service tie-ins south of the outfall at Herring Run were identified on the video survey: one from the west at 30 feet and the other from the east at 50 feet. A vertical surface drain with sunlight shining through the cover was identified approximately 230 feet south of the outfall at Herring Run. Based on direction and distance, it is assumed that this drain is located within the automobile storage yard on the north side of Quad Avenue operated by the City (Photographs 26 and 27 and Appendix A, Section 8.0). At approximately 290 feet south of the outfall at Herring Run, the 5-ft by 10-ft box culvert is divided into three round pipes side by side. Based on direction and distance it is assumed that this three-pipe structure is under Quad Avenue (Figure F-5). The camera unit entered the pipe on the west side. Within this round pipe, services were identified from the west at 336 and 380 feet. At 425 feet south of Herring Run, the drainage system changes back to a 5-ft by 10-ft box culvert. The camera unit was unable to go beyond this point due to stones and debris blocking its path. Although the camera unit was unable to reach the point where the northern recording from MH-6 had been stopped, survey data collected for this investigation and stormwater mapping from the City of Baltimore, indicate that the two areas are connected along the box culvert.

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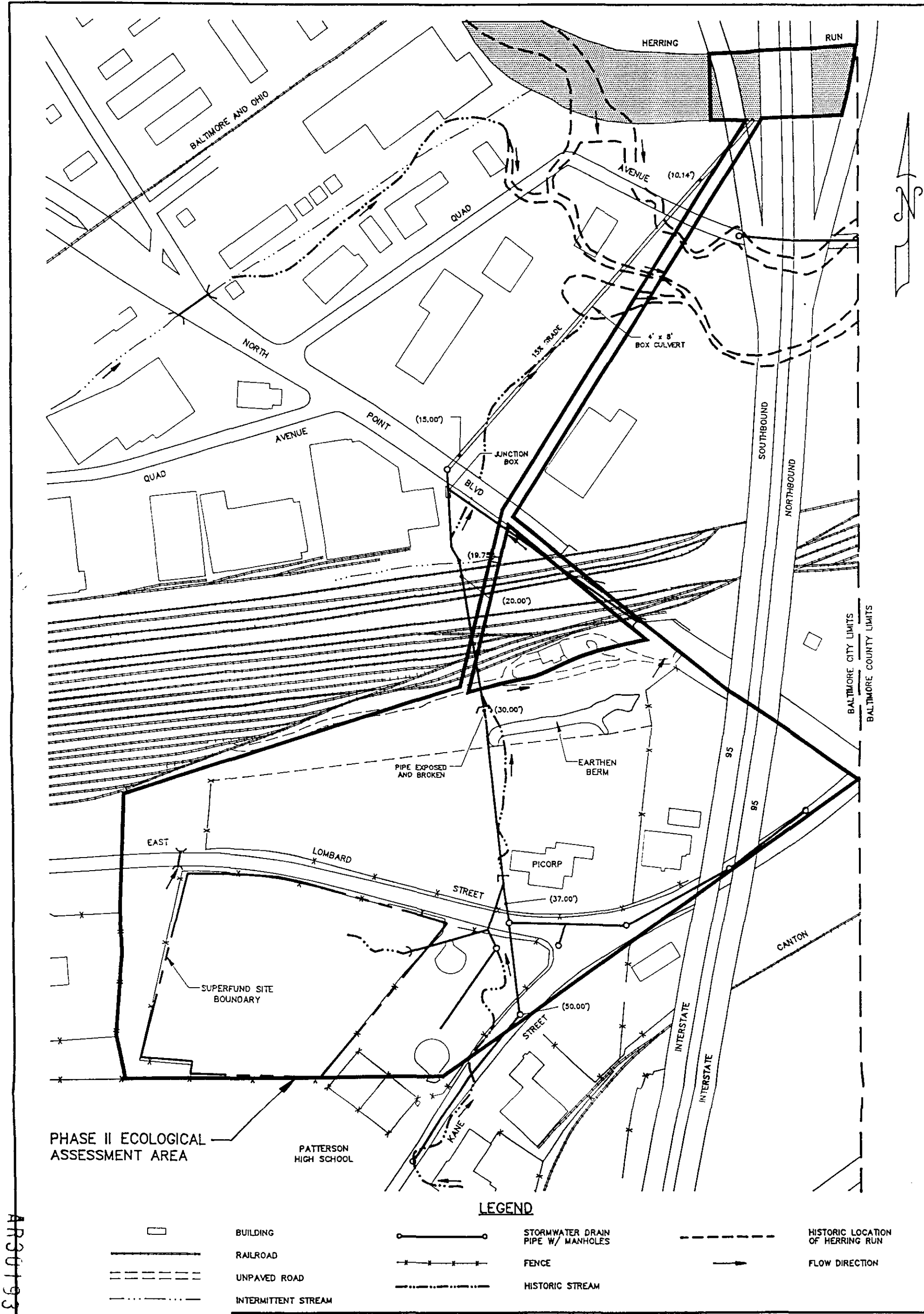
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NOTE: CITY OF BALTIMORE DEPARTMENT OF PUBLIC WORKS BUREAU OF SEWERS & STORMWATER MAPPING 1927-1959 WITH UNDATED REVISIONS

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STORMWATER DRAINAGE SYSTEM AS MAPPED BY THE CITY OF BALTIMORE

KANE AND LOMBARD STUDY AREA
 BALTIMORE, MARYLAND

FIGURE **F-3**

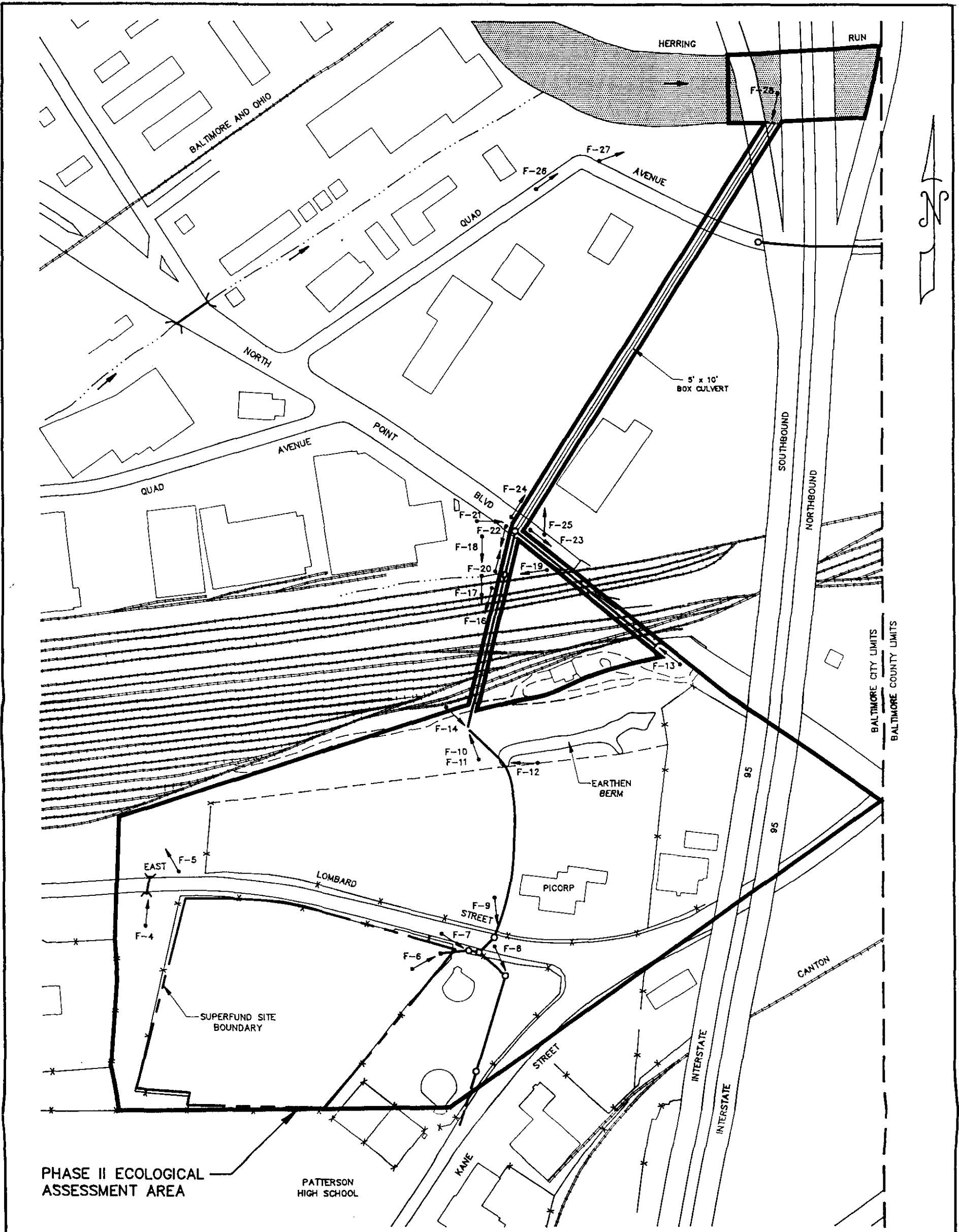
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PHASE II ECOLOGICAL ASSESSMENT AREA

PATTERSON HIGH SCHOOL

LEGEND

- | | | | |
|--|---------------------|--|--------------------------------|
| | BUILDING | | RAILROAD |
| | INTERMITTENT STREAM | | FENCE |
| | UNPAVED ROAD | | PHOTO LOCATION AND DESIGNATION |

NOTE: PHOTOS F-22, F-23 & F-24 WERE TAKEN FROM WITHIN THE MANHOLE CHAMBER.

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STORMWATER DRAINAGE INVESTIGATION PHOTOGRAPH LOCATIONS & DIRECTIONS

KANE AND LOMBARD STUDY AREA
BALTIMORE, MARYLAND

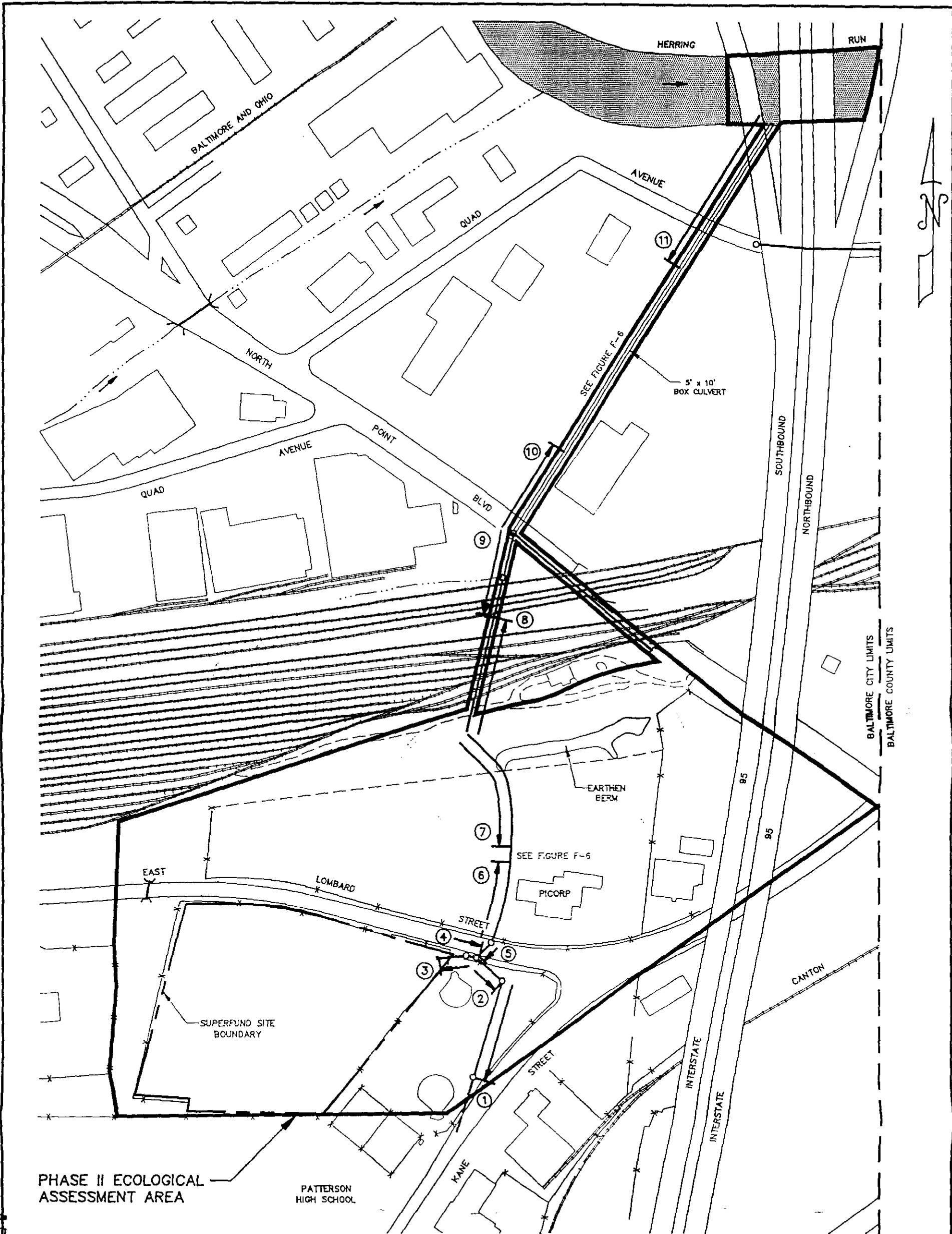
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LEGEND

- | | | | |
|--|---------------------|--|---------------------------------------|
| | BUILDING | | FENCE |
| | INTERMITTENT STREAM | | DIRECTION AND LENGTH OF VIDEO SEGMENT |
| | UNPAVED ROAD | | STORMWATER VIDEO SEGMENT |
| | RAILROAD | | |

SOURCE: SEGMENTS REFERENCED ON STORMWATER VIDEO TAPE

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STORMWATER VIDEO SEGMENTS MAP

KANE AND LOMBARD STUDY AREA
BALTIMORE, MARYLAND

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DATE 3/14/95

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DESCRIPTION OF IMAGERY Oversized Map: Kane & Lombard study Area

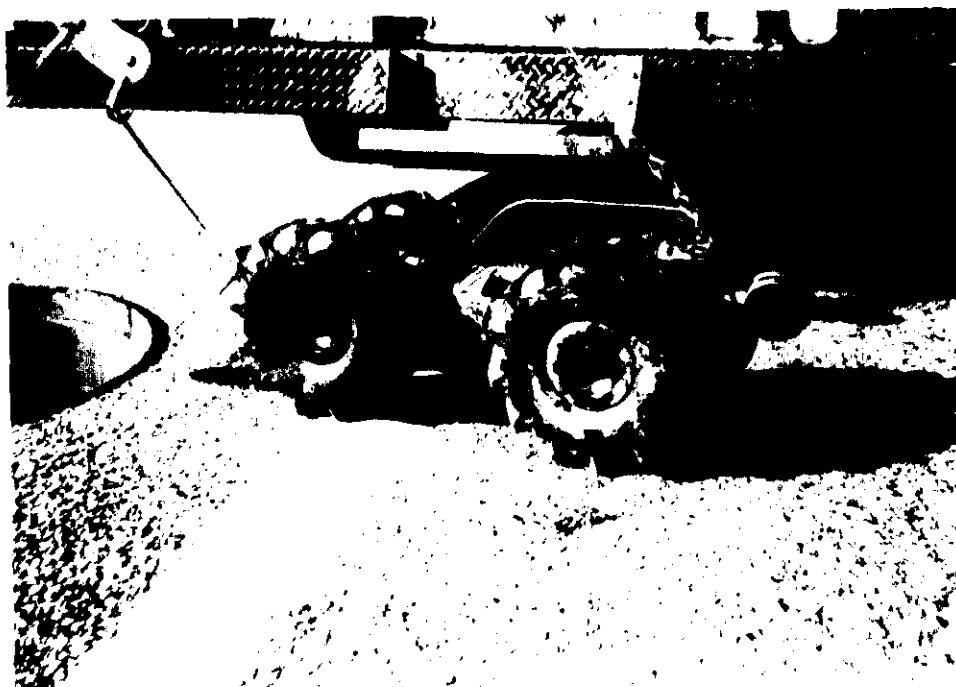
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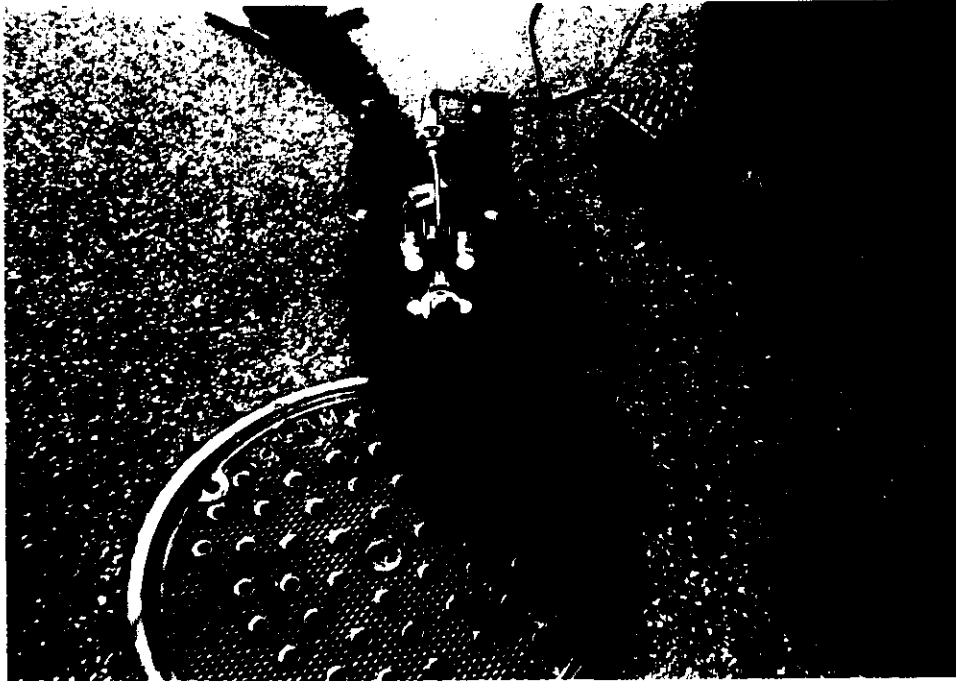
PHOTOGRAPH F-1

Video survey was performed by Allstate PowerVac of Linden, New Jersey



PHOTOGRAPH F-2

The mechanized survey camera



PHOTOGRAPH F-3

High powered adjustable lights provided visibility in drainage pipes

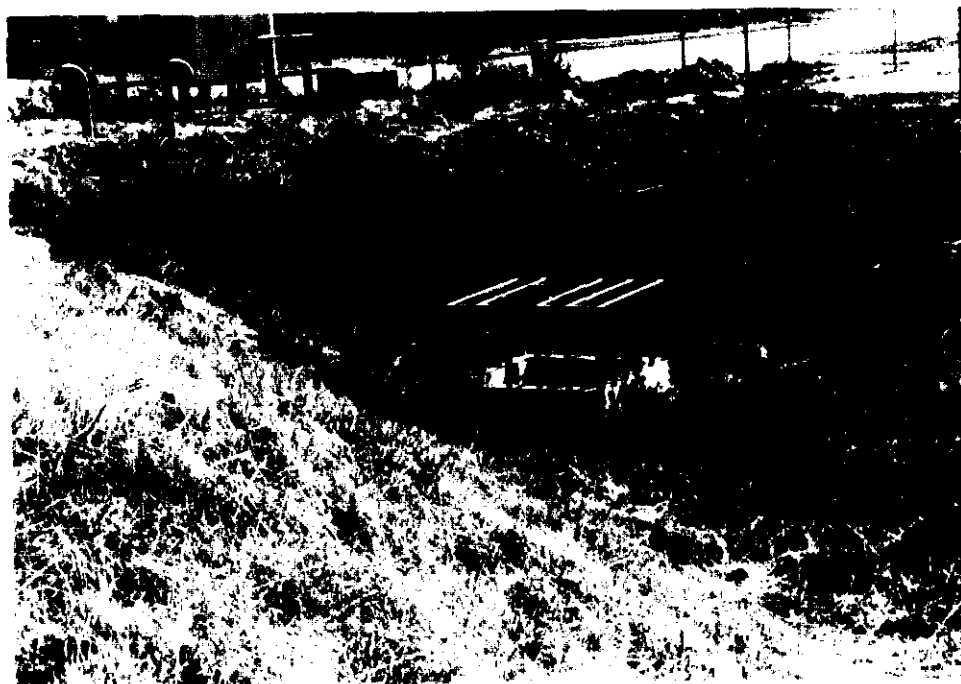
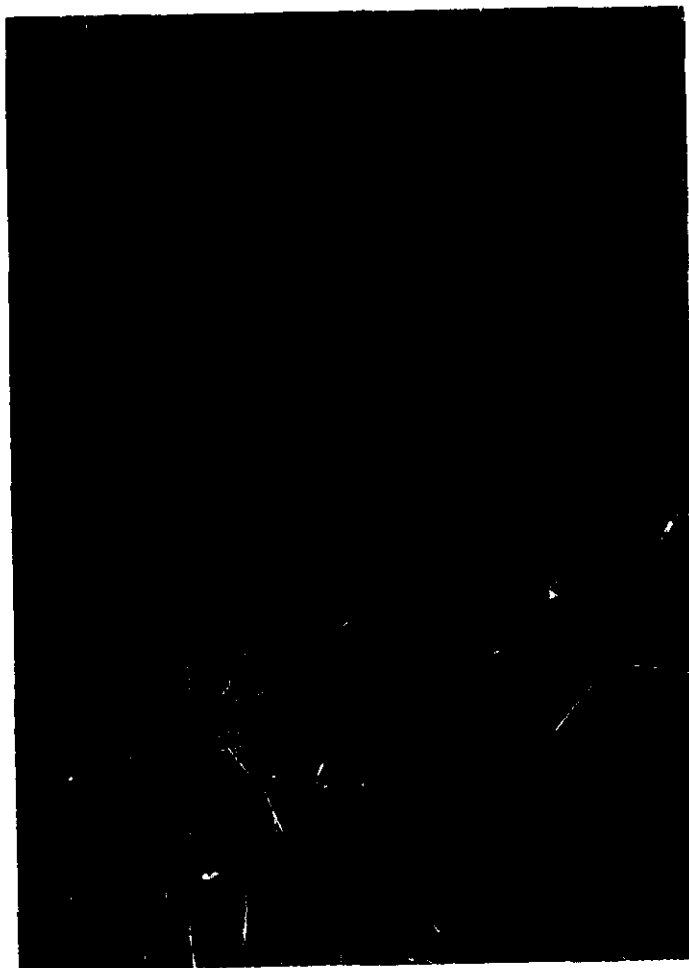


PHOTOGRAPH F-4

Water from wetlands on Roadway property is channeled through this culvert under East Lombard Street

PHOTOGRAPH F-5

**Manhole adjacent to wetlands on
north side of East Lombard Street**



PHOTOGRAPH F-6

Stormwater catch basin in northeast corner of the Superfund Site



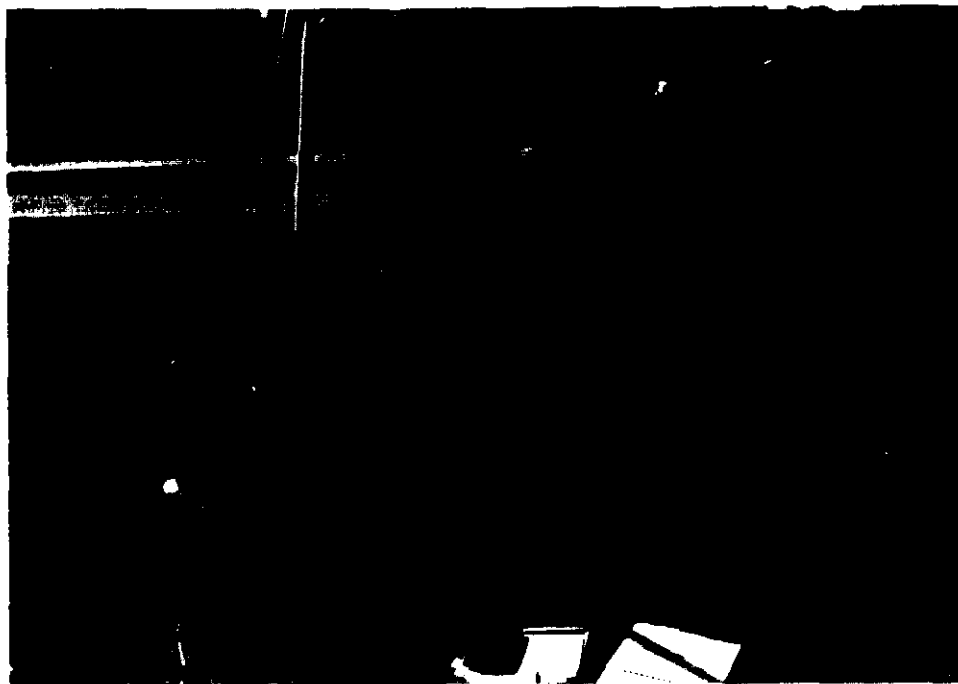
PHOTOGRAPH F-7

Manhole 2 (MH-2)



PHOTOGRAPH F-8

Manhole 1 (MH-1)



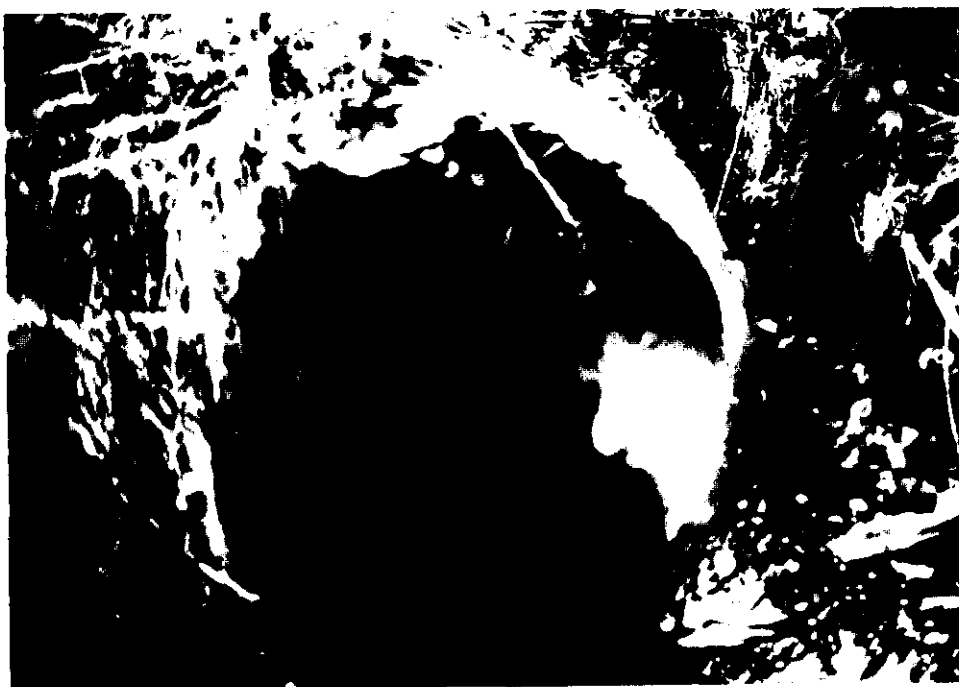
PHOTOGRAPH F-9

Manhole 1B (MH-1B) in westbound lane of East Lombard Street



PHOTOGRAPH F-10

Excavated catch basin north of the PICORP facility



PHOTOGRAPH F-11

Inlet to catch basin north of PICORP, a 42-inch RCP



PHOTOGRAPH F-12

Sinkhole pipe separation north of PICORP



PHOTOGRAPH F-13

Stormwater Inlet structure adjacent to North Point Boulevard

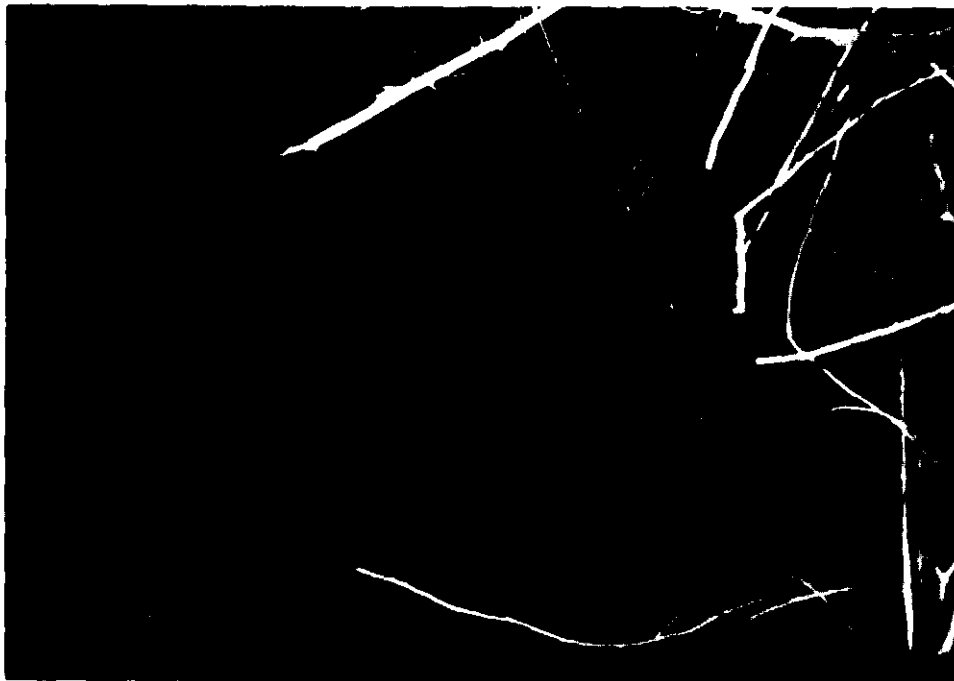


PHOTOGRAPH F-14

36-inch RCP carrying stormwater north under Conrail tracks from excavated catch basin

Photograph locations and directions of view shown on Figure F-4

AR301946



PHOTOGRAPH F-15

3-ft by 5-ft box culvert under tracks



PHOTOGRAPH F-16

Open, concrete-lined channel north of Conrail tracks



PHOTOGRAPH F-17

Inlet structure in rail yard



PHOTOGRAPH F-18

Pipe appears to drain inlet structure between tracks



PHOTOGRAPH F-19

Circular drainage structure adjacent to concrete-lined channel



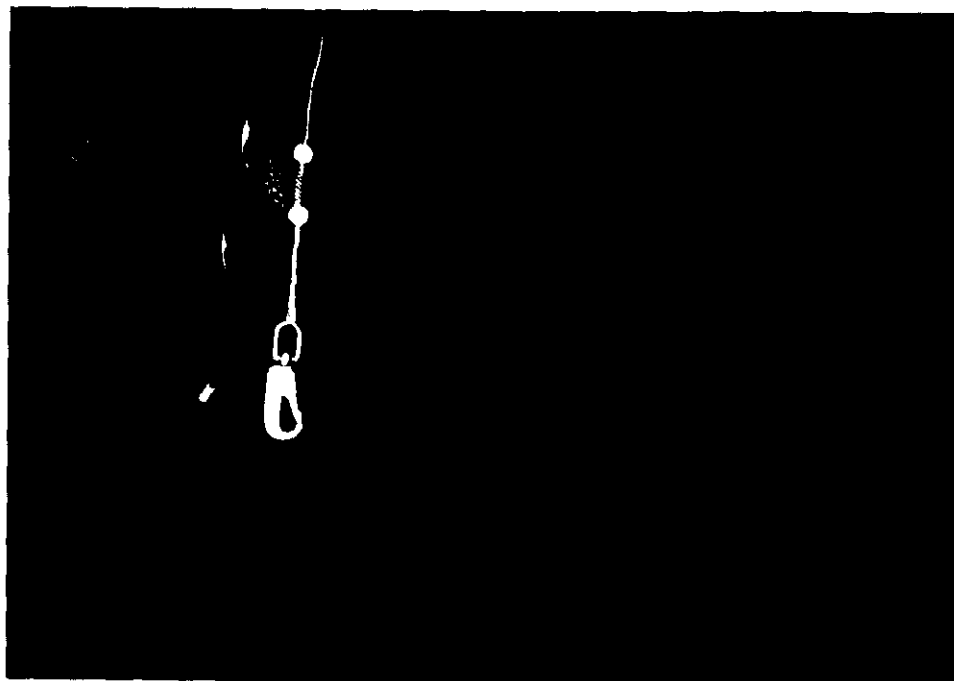
PHOTOGRAPH F-20

48-inch RCP carrying stormwater north from concrete-lined channel



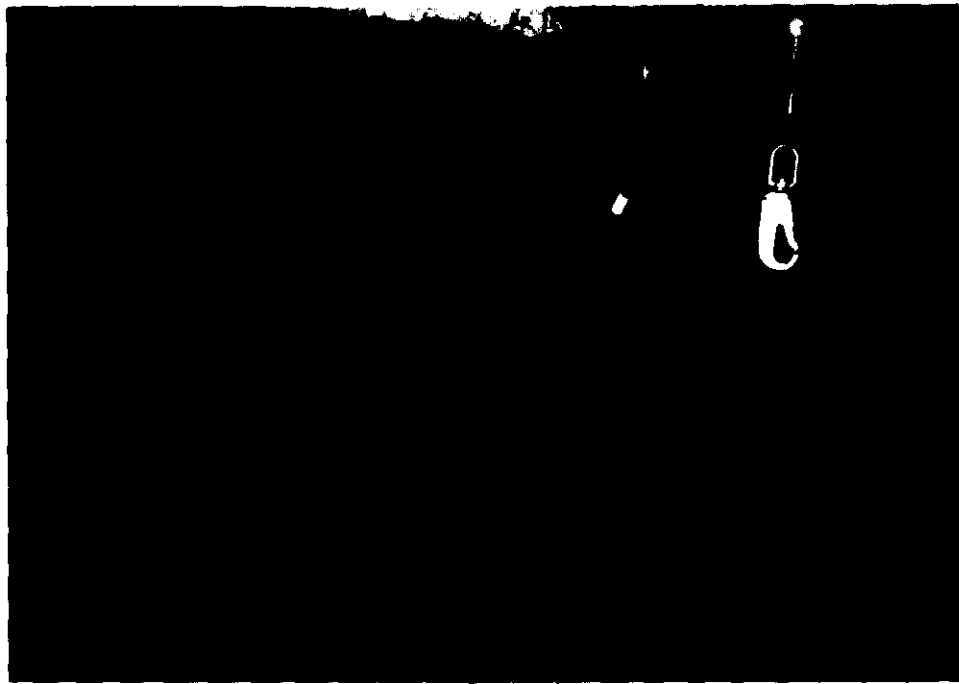
PHOTOGRAPH F-21

Manhole 6 (MH-6) in eastbound lane of North Point Boulevard



PHOTOGRAPH F-22

From MH-6 chamber, looking into 48-inch RCP from concrete-lined channel



PHOTOGRAPH F-23

**From MH-6 chamber, looking into pipe believed to connect to inlet
in structure in Photograph F-13**



PHOTOGRAPH F-24

From MH-6 chamber, looking to north into 5-ft by 10-ft box culvert



PHOTOGRAPH F-25

Manhole in westbound lane of North Point Boulevard



PHOTOGRAPH F-26

Automobile Impoundment lot on Quad Avenue, adjacent to Herring Run



PHOTOGRAPH F-27

Automobile impoundment lot adjacent to Herring Run



PHOTOGRAPH F-28

5-ft by 10-ft outfall at Herring Run